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Presentation Abstract

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Presentation:	262 - Maintenance mechanisms of Rift Valley fever virus in a temperate and mountainous ecosystem of Madagascar: dynamic and spatial modelling based on field data
Location:	Uxmal 1 (7)
Pres. Time:	Friday, Nov 06, 2015, 11:00 AM -11:15 AM
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Abstract:

Purpose:
Rift Valley fever virus (RVFV) is a mosquito-borne zoonosis endemic in Africa. Since 1930, outbreaks have occurred in tropical, hot-irrigated or arid ecosystems. In 2008-2009, an outbreak occurred in a temperate and mountainous area of Madagascar highlands. We conducted a 3-year serological follow-up in cattle in a pilot area of these highlands (894 bovine in 2009, 516 in 2010 and 210 in 2011). Cattle exchange and vector population dynamics were investigated. Despite unfavourable climatic conditions and absence of Aedes mosquitoes (main vectors in Africa), results showed that the virus kept circulating till 2011 in absence of clinical cases.
The objective of this study was to understand the mechanisms allowing the virus to circulate in this unfavourable ecosystem. We propose a model coupling cattle exchange practices and vector-borne transmission to explain the RVFV spread and persistence in this area.

Methods:
The model is parameterized to reproduce the local conditions of Madagascar highlands, using observational data collected in the area: villages/ rice field locations, number of cattle per village, cattle birth/death rates, cattle exchange networks built using SNA methodology, monthly abundance of mosquitoes, monthly variations of the mosquito parity rate. Non-observable parameters such as transmission parameters were estimated using collected serological data.
The model was used to analyse 3 potential mechanisms that could explain the recurrent circulation of RVFV in the area: (i) recurrent introductions from other regions of Madagascar, (ii) RVFV direct transmission between cattle during calving period, (iii) a low level vector-based circulation during winter thanks to a residual vector population. All possible combinations were tested.

Results:
Predictions satisfactorily reproduced field observations. Results appeared robust according to the sensitivity analysis.

Conclusions/ Relevance:
Interweaving between agricultural works in rice fields, seasonality of vector proliferation, cattle exchange and traditional practices (socio-economic practices) could be a key element for understanding RVFV circulation in this area of Madagascar highlands.